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REMARKS

Entry of this Amendment is proper since it does not raise new issues and does not require further search by the Examiner

Claims 1-29 are all the claims presently pending in the application. Claims 1-2, 17, 19-24 and 26-27 have been amended to more particularly define the invention.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Applicant notes that claims 21-29 are not subject to a prior art rejection. Therefore, presumably, these claims would be allowable if the alleged informalities are addressed.

Claims 1-29 stand rejected upon informalities (e.g., 35 U.S.C. § 112, first and second paragraphs). Claims 1-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Taniuchi, et al. (U.S. Patent No. 6,013,393) in view of Nishijima, et al. (U.S. Patent No. 6,534,214).

These rejections are respectfully traversed in view of the following discussion.

I. THE CLAIMED INVENTION

The claimed invention (e.g., as defined by claim 1 and similarly in claims 19 and 20) is directed to a lithium battery which includes a power-generating element having a positive electrode, a negative electrode and a separator, each of which includes a gel electrolyte which includes a polymer and a liquid electrolyte. The gel electrolyte includes a liquid electrolyte having a concentration of lithium salt in a range from 2 to 4 mols per liter of the liquid electrolyte, and a polymer including a polymerized polyfunctional (meth) acrylate monomer, the gel electrolyte including the polymerized polyfunctional (meth) acrylate monomer in a range from 5% to 30% by weight.

Importantly, the gel electrolyte of the separator includes a polyfunctional (meth) acrylate

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monomer that is different than the polyfunctional (meth) acrylate monomer in the gel electrolyte of the positive and negative electrodes.

As explained in the Application, in conventional batteries the diffusion of lithium ion cannot overtake the demand rate of lithium ion required by the positive electrode during high rate discharge, making it difficult to keep the battery performance at a sufficient level (Application at page 3, line 21-page 4, line 1).

The claimed invention, on the other hand, includes a power-generating element having positive and negative electrodes and a separator, each of which includes a gel electrolyte, and the gel electrolyte of the separator includes a polyfunctional (meth) acrylate monomer that is different than the polyfunctional (meth) acrylate monomer in the gel electrolyte of the positive and negative electrodes. (Application at page 11, line 12-page 13, line 20). This novel feature helps to allow the inventive battery to provide a good high rate discharge performance (e.g., see Table 1 on page 18).

II. THE 35 USC §112, FIRST PARAGRAPH REJECTION

Claims 1-29 stand rejected under 35 U.S.C. §112, first paragraph. However, Applicant would point out that the claims have been amended to address the Examiner's concerns. Therefore, these claims are fully enabled by the specification.

Specifically, Applicant would point out that claims 1, 19 and 20 have been amended to recite "*wherein said gel electrolyte in said separator comprises a polyfunctional (meth) acrylate monomer that is different than said polyfunctional (meth) acrylate monomer in said gel electrolyte in said positive and negative electrodes*", which is disclosed in the Application at page 11, line 12-page 13, line 20. Thus, it is clear in what manner the gel electrolyte in the separator is different than the gel electrolyte in at least one of the positive and negative electrodes.

Further, Applicant would point out that claim 21 has been amended to recite "*wherein an amount of said polyfunctional (meth) acrylate monomer in said gel electrolyte of said positive and negative electrodes is different than an amount of said polyfunctional (meth) acrylate*

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monomer in said gel electrolyte of said separator", which should address the Examiner's concern that the specification does not support a "polymerized" polyfunctional (meth) acrylate monomer which is different in the separator and the positive and negative electrodes.

Further, with respect to claims 23, 24, 26 and 27, Applicant would point out that these claims have been amended to delete the term "pressed laminate". Therefore, these claims are clearly enabled by the specification.

In view of the foregoing, Applicant submits that these claims are fully enabled by the specification.

III. THE 35 USC §112, SECOND PARAGRAPH REJECTION

Claims 1-29 stand rejected under 35 U.S.C. §112, second paragraph. However, Applicant would point out that the claims have been amended to address the Examiner's concerns. Thus, Applicant submits that these claims are not indefinite.

Specifically, as noted above, claims 1, 19 and 20 have been amended to recite "*wherein said gel electrolyte in said separator comprises a polyfunctional (meth) acrylate monomer that is different than said polyfunctional (meth) acrylate monomer in said gel electrolyte in said positive and negative electrodes*", which is disclosed in the Application at page 11, line 12-page 13, line 20. Thus, it is clear in what manner the gel electrolyte in the separator is different than the gel electrolyte in at least one of the positive and negative electrodes.

Further, as noted above, claim 21 has been amended to recite "*wherein an amount of said polyfunctional (meth) acrylate monomer in said gel electrolyte of said positive and negative electrodes is different than an amount of said polyfunctional (meth) acrylate monomer in said gel electrolyte of said separator*", which should address the Examiner's concern that it is not clear how the "polymerized" polyfunctional (meth) acrylate monomer is different in the separator and the positive and negative electrodes.

In view of the foregoing, Applicant submits that these claims are not indefinite as alleged by the Examiner.

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IV. THE TANIUCHI AND NISHIJIMA REFERENCES

The Examiner alleges that Taniuchi would have been combined with Nishijima to form the teaches the claimed invention of claims 1-20. Applicant would submit, however, that these references would not have been combined and even if combined, the alleged combination would not teach or suggest each and every element of the claimed invention.

Taniuchi discloses an ionic conductive polymer gel for a secondary battery. The battery has an electrolyte salt component which includes a sulfonated derivative with formula $\text{LiX}(\text{SO}_2\text{R}^1)_n$, where X is N, C, B, O or $-\text{C}(\text{R}^2)_m-$ in which R^2 is a hydrogen atom, an alkyl group having 1 to 12 carbon atoms, and m is an integer of 1 to 2, R^1 is a halogenated alkyl group having 1 to 12 carbon atoms, and n is an integer of 1 to 3, a non-aqueous solvent, and a polymer matrix prepared by polymerizing a polymerizable material including at least one (meth) acrylate monomer with a molecular weight of 1000 or less, in the presence of the electrolyte salt component and the non-aqueous solvent (Taniuchi at Abstract).

Nishijima discloses a lithium secondary cell which is intended to provide a high output potential and have excellent low-temperature characteristics and negative electrode characteristics, by using a solid electrolyte having different compositions in the positive and negative electrodes and a solid electrode having a third composition between the two electrodes (Nishijima at col. 2, lines 38-60).

However, Applicant would respectfully submit that these references would not have been combined as alleged by the Examiner. Indeed, these references are completely unrelated, and no person of ordinary skill in the art would have considered combining these disparate references, absent impermissible hindsight.

In fact, Applicant submits that the Examiner can point to no motivation or suggestion in the references to urge the combination as alleged by the Examiner. Indeed, contrary to the Examiner's allegations, neither of these references teach or suggest their combination.

Therefore, one of ordinary skill in the art would not have been so motivated to combine the references as alleged by the Examiner. Therefore, the Examiner has failed to make a prima facie case of obviousness.

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Moreover, Applicant submits that neither Taniuchi, nor Nishijima, nor any alleged combination thereof teaches or suggests “*wherein said gel electrolyte in said separator comprises a polyfunctional (meth) acrylate monomer that is different than said polyfunctional (meth) acrylate monomer in said gel electrolyte in said positive and negative electrodes*”, as recited, for example, in claims 1 and 19-20.

As noted above, unlike conventional batteries in which the diffusion of lithium ion cannot overtake the demand rate of lithium ion required by the positive electrode during high rate discharge, making it difficult to keep the battery performance at a sufficient level, the claimed invention includes a power-generating element having positive and negative electrodes and a separator, each of which includes a gel electrolyte, and the gel electrolyte in the separator includes a polyfunctional (meth) acrylate monomer that is different than the polyfunctional (meth) acrylate monomer in the gel electrolyte in the positive and negative electrodes (Application at page 11, line 12-page 13, line 20). This novel feature helps to allow the inventive battery to provide a good high rate discharge performance (e.g., see Table 1 on page 18).

Clearly, the cited references do not teach or suggest this feature of the claimed invention. Indeed, the Examiner concedes on page 8 of the Office Action that Taniuchi does not teach or suggest this feature.

Further, Nishijima does not teach or suggest this feature. Indeed, the Examiner alleges that Nishijima teaches “that the gel electrolyte composition in the positive electrode, the negative electrode, and the separator is varied by varying the organic solvent in each of the three components”.

However, Applicant submits that nowhere does Nishijima teach or suggest a gel electrolyte in the separator having a polyfunctional (meth) acrylate monomer which is different than the polyfunctional (meth) acrylate monomer in the gel electrolyte of the positive and negative electrodes. In fact, Nishijima teaches that the type of monomer in the solid electrolyte in each of the positive electrode 3, the negative electrode 6 and the solid electrolyte layer 3 between the electrodes, is the same (e.g., see Nishijima at col. 4, lines 17-21).

Therefore, Applicant would respectfully submit that these references would not have been

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combined and even if combined, the alleged combination would not teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

V. FORMAL MATTERS AND CONCLUSION

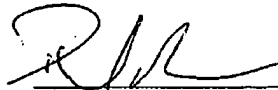
In view of the foregoing, Applicant submits that claims 1-29, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date:

12/30/04

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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that the foregoing Amendment was filed by facsimile with the United States Patent and Trademark Office, Examiner Susy Tsang Foster, Group Art Unit # 1745 at fax number (703) 872-9306 this 30th day of December, 2004.



Phillip E. Miller

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